
بسم الله الرحمن الرحيم

Approach to urinary tract infections

Dr . Marwa M. Reda
Assistant proffessor of internal medicine
PNU Faculty of Medicine.

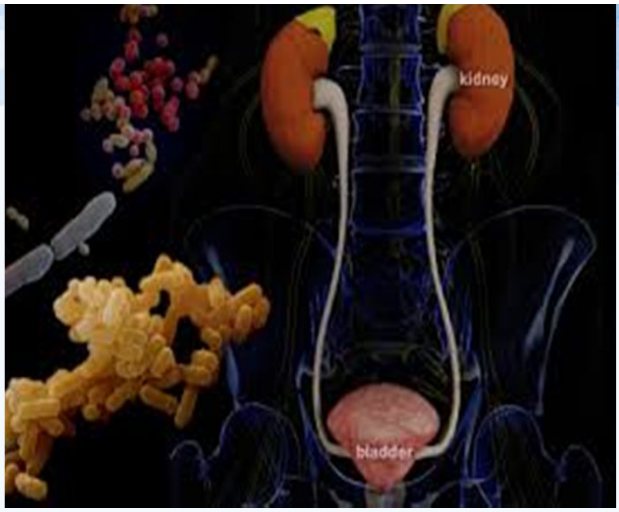
ILO‘S

- Definition
- Etiology and Pathogenesis
- risk factors
- Clinical Manifestations
- Diagnosis
- Treatment

Urinary tract infection (UTI)

is the most common infection experienced by humans after respiratory and gastro-intestinal infections, and also the most common cause of both community-acquired and nosocomial infections for patients admitted to hospitals.

Urinary tract infection (UTI)

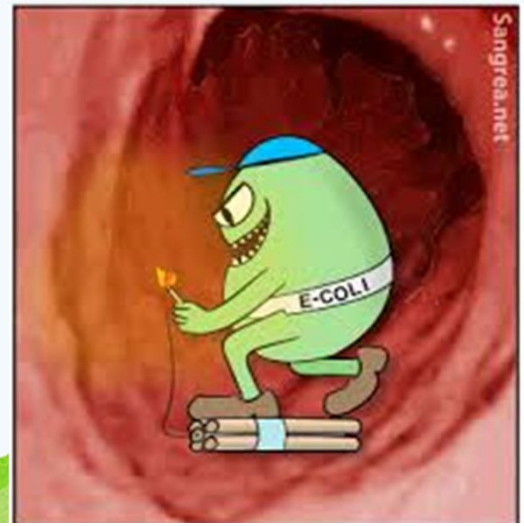


UTI may be defined as a condition in which bacteria are established and multiplying within the urinary tract (extending from urethral orifice to the renal cortex).

Diagnosis requires demonstration of bacteriuria.

Urinary tract infection (UTI)

Exceptions to this include patients with pyogenic abscess of kidney or perinephric tissue, obstructed pyonephrosis or bacterial prostatitis in whom the urine may be sterile.



Case scenario

History:

A 29-years-old, sexually active woman presents to the emergency room complaining of a 2-day history of urinary frequency, burning, and urgency. She denies vaginal discharge or itching, fever, chills, nausea, vomiting, back pain, abdominal pain, or hematuria. She has no history of UTI or a sexually transmitted disease. She recently began using a diaphragm for birth control, and reports that her last menstrual period occurred 3 weeks ago. She has only one sexual partner, who denies penile discharge or burning on urination.

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What are your provisional diagnosis?

- ✓**What are the signs and symptoms of lower UTI, and how do these differ from those of pyelonephritis?**
- ✓**Complicated vesus uncomplicated.**
- ✓ **What host factors lead to the development of urinary tract infections (UTIs), and how are these factors different for men and women?**
- ✓**What organisms commonly cause lower UTIs?**

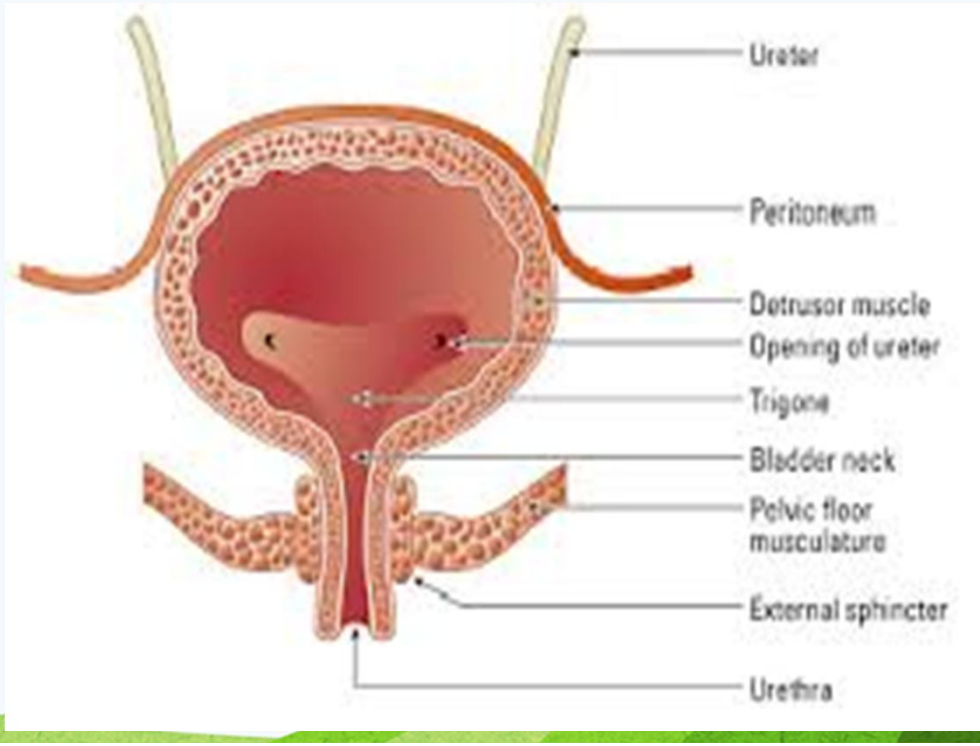
1. Anatomic location:

- ✓**Infections confined to lower urinary tract commonly cause dysuria, frequency, urgency and suprapubic discomfort. Signs may include fever, cloudy or foul-smelling urine, and hematuria..**
- ✓**Pyelonephritis (inflammation of the renal parenchyma) is a clinical syndrome characterized by chills and fever, flank pain and constitutional symptoms caused by bacterial invasion of the kidney.**

1. Anatomic location:

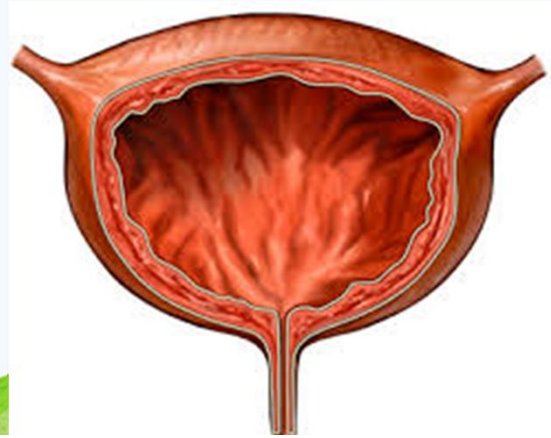
- ✓ **Although the diagnosis of UTI should be confirmed by urinalysis, there is evidence that history alone can be very accurate. If a woman complains of dysuria and increased frequency without vaginal discharge, the likelihood ratio of UTI is about 25, and UTI can be predicted with greater than 90% probability.**
- ✓ **But the localization of the site of infection on the basis of symptoms and signs can be inaccurate in few occasions.**

2. Complicated and uncomplicated urinary tract infection



- **An uncomplicated infection is an episode of cysto-urethritis following bacterial colonization of the ureteral and bladder mucosae because sequelae are rare**

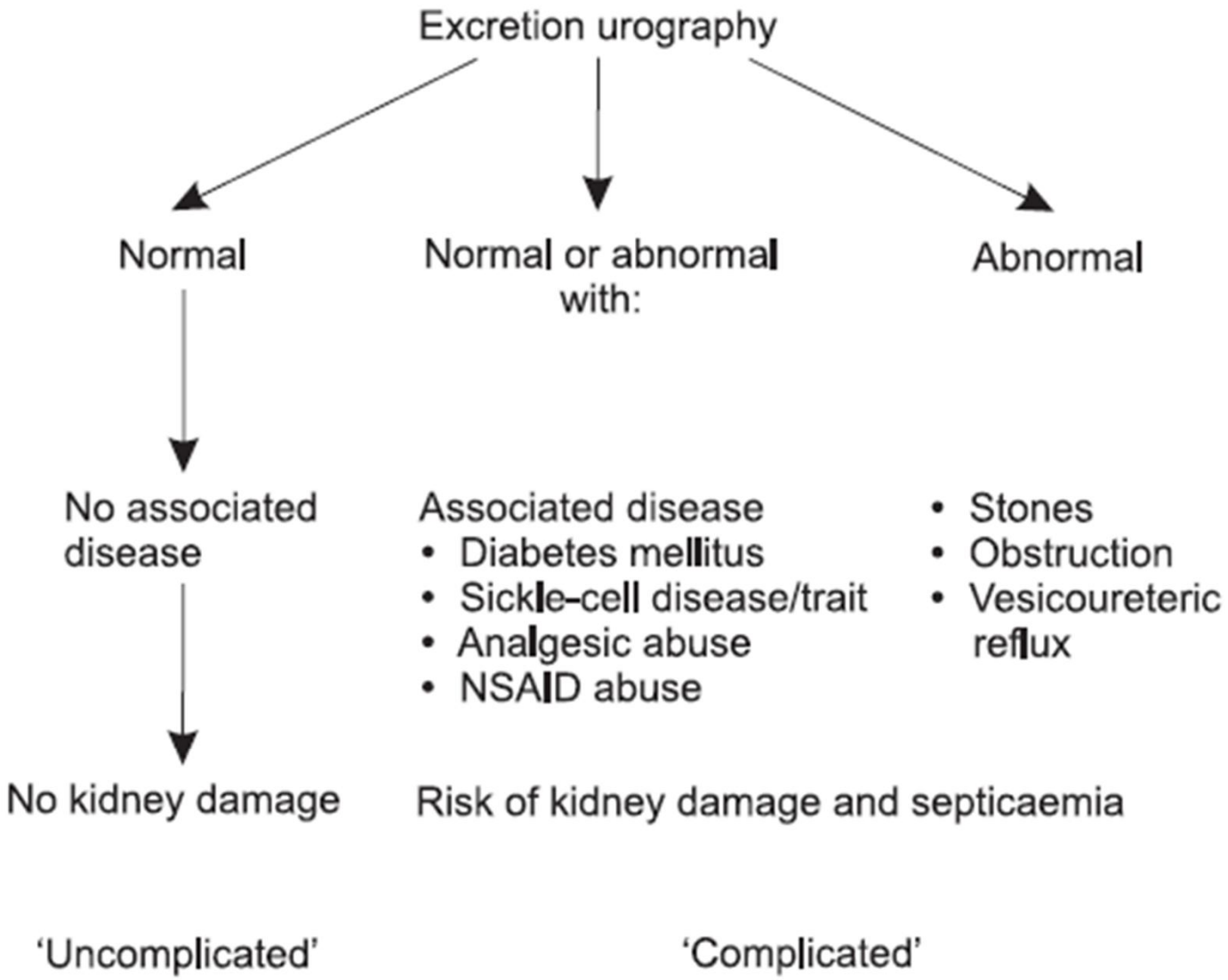
- **A subset of patients with pyelonephritis, namely, young women who respond well to therapy may also have a low incidence of sequelae.**



- **Complicated infections include those involving the parenchyma (pyelonephritis or prostatitis) and frequently occur in the setting of obstructive uropathy or after instrumentation.**
- **The presence of obstruction, stones or high-pressure vesicoureteric reflux, perinephric abscess, life-threatening septicemia or a combination of these predispose to kidney damage and may be refractory to therapy resulting in relapses .**

Factors predisposing to treatment failure:

- Recent antibiotic treatment
- Hospital acquired infection
- Renal or bladder calculi
- Obstructive uropathy
- Renal cysts
- Renal diseases such as reflux nephropathy, chronic interstitial nephropathy, analgesic nephropathy, diabetic nephropathy, sickle cell nephropathy, immunosuppression, and prostatitis.



Classification of complicated and uncomplicated urinary tract infection.

Etiology and Pathogenesis

The understanding of the pathogenesis and epidemiology of urinary tract infections can facilitate early recognition and possible prevention.

Causative organisms:

- **Escherichia coli causes most (up to 80%) of the community-acquired uncomplicated UTIs, with Klebsiella, Enterobacter, and Proteus organisms more likely to cause complicated or hospital-acquired UTIs. These are all gram-negative organisms that usually originate from the patient's own gastrointestinal flora. There are, however, several gram-positive organisms that occur as urinary pathogens. Staphylococcus saprophyticus, a coagulase-negative Staphylococcus organism, causes 20% or more of the UTIs in women 16 to 35 years of age. Streptococcus faecalis causes 2% to 3% of the UTIs in otherwise healthy young women.**

- When Staphylococcus aureus is found in the urine, a bacteremic infection of the kidney should be suspected.
- Chlamydia, Ureaplasma, Mycoplasma, and Neisseria gonorrhoeae are sexually transmitted pathogens that usually cause vaginal or cervical infections; however, they may be implicated in cases of acute urethral syndrome in which Gram's-stained urine samples exhibit pyuria without bacteriuria.
- Pseudomonas are more commonly nosocomial gram-negative pathogens that are not usually seen in community-acquired, uncomplicated UTIs.

Associations have been established between UTI and:

- age,
- pregnancy,
- sexual intercourse,
- use of diaphragm and a spermicide,
- delayed post-coital micturition,
- menopause
- and a history of recent UTI.

At any age, both sexes may develop symptomatic infections in the presence of risk factors that alter urinary flow.

- 1.Congenital anomalies
- 2. Renal calculi
- 3. Ureteral occlusion (partial or total)
- 4. Vesico-ureteral reflux
- 5. Residual Urine in bladder
- Neurogenic bladder, Urethral stricture, Prostatic hypertrophy
- 6. Instrumentation of urinary tract


Clinical Settings

Asymptomatic bacteriuria

This is especially common in women as evidenced by a minimum prevalence of 2-4% in young and 10% in elderly women. The cumulative prevalence of asymptomatic bacteriuria in women increases about 1% per decade throughout life regardless of ethnicity and geographic locations. This attributed to the shorter female urethra and its proximity to the vagina and rectal mucosa and their abundant microbial flora.

Asymptomatic bacteriuria

In contrast to women, the occurrence of asymptomatic bacteriuria in men is rare until after 55 years of age, at which time the prevalence increases per decade and approaches the rate in elderly women. Prostatic hypertrophy and increased likelihood of instrumentation account for the bacteriuria in older men.

Asymptomatic bacteriuria

Asymptomatic bacteriuria should not be treated except in:

- **pregnancy.**
- **Haemodialysis patients evaluated for renal transplantation should be given prophylaxis when they undergo invasive urological diagnostic procedures.**
- **Diabetic and immunocompromised patients should be frequently monitored before treatment.**

Symptomatic UTI

- **These occur in all age groups.**
- **When urinary tract is the source of neonatal sepsis, serious underlying congenital anomalies are frequently present.**
- **During childhood, if persistent bacteriuria with or without repeated symptomatic episodes occurs a urological evaluation to detect correctable structural abnormalities when UTIs are documented**

Symptomatic UTI

Sexually active women have a markedly increased risk of cystitis. Vast majority of acute symptomatic infections involve young women. with an annual incidence of 0.5-0.7 episodes per patient year in this group.

Symptomatic UTI

symptomatic UTIs are unusual in men. The risk of cystitis in young men due to uropathogenic coli increases because of lack of circumcision or having a partner with vaginal colonization with such P-fimbriated E. coli.

On making urine analysis:

- ✓ A urinalysis reveals 1+ protein, 2+ leukocytes estrease, 1+ blood (dipstike) and 50 WBCs/hpf, 10 RBCs/hpf, and many bacteria The urine pH is 5.6. Gram's staining of an unspun urine specimen reveals abundant polymorphonuclear leukocytes and moderate gram-negative rods.

What are the expected questions ?

- ✓ Should this woman's sexual partner be evaluated for UTI?
- ✓Is it indicated to do urine culture?
- ✓Was the Gram's staining an important diagnostic test, and in what way did the findings alter the management of this case?
- ✓What is the value of knowing the urine pH in this setting?
- ✓What other diagnostic or laboratory tests should have been performed?

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Diagnosis

Microscopic examination of urine.
Urine culture.
imaging

Indications and choice of renal imaging

Acute infection

Patients who have severe loin pain or whose infection does not settle on treatment should have US and plain X-ray to exclude pyonephrosis, intrarenal or perinephric sepsis or calculi. CT may be undertaken if no abnormality is seen on US in such patients. If ureteric colic is suspected, IVU or spiral CT should be used.

Imaging after treatment of infection

- In women, there is no indication for imaging following a single or infrequent infection. Recurrent attacks more often than 2 per 6 months should be investigated by USG and plain KUB.

- In men, UTI is much less common than in women, and imaging is indicated after the first documented bacteriuria to exclude predisposing factors especially impaired bladder emptying. USG and plain film are the best first choice.

1 Your next action is to:

- A) Culture her urine.
- B) Start an antibiotic.
- C) Prescribe a bladder anesthetic.
- D) Obtain a CBC.
- E) Recommend drinking twice as much cranberry juice.

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Since the clinical history and urinalysis findings are consistent with UTI and the patient is otherwise healthy, no further tests are necessary. You should proceed with antibiotic therapy.

2. All of the following are risk factors for complicated UTI or renal infection EXCEPT:

- A) Advancing age.
- B) Frequent sexual intercourse.
- C) Diabetes.
- D) Recent antibiotic use.
- E) Tampon use.

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2. All of the following are acceptable first-line agents in a woman with an uncomplicated urinary tract infection EXCEPT:

- **A) Nitrofurantoin.**
- **B) Ciprofloxacin.**
- **C) An oral cephalosporin (e.g., cephalexin (Keflex))**
- **D) Trimethoprim/sulfamethoxazole.**
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- Macrolides, such as azithromycin, have very poor gram-negative coverage and are not useful in treating UTI.

TMP-SMX remains the drug of choice for the empirically based treatment of uncomplicated UTIs. For sulfa-allergic patients, ampicillin, amoxicillin, a first-generation cephalosporin, or a quinolone is the appropriate alternative. Therapy may then be modified on the basis of the urine culture results and the sensitivities of the infecting organism. Enterococci are not susceptible to either TMP-SMX or cephalosporins, which points out the utility of performing urine Gram's staining when deciding on antibiotic therapy. The prevalence of ampicillin-resistant E. coli may be as high as 30% in some communities, and this needs to be considered when selecting an appropriate antibiotic. S. saprophyticus responds to ampicillin, TMP-SMX, and the quinolones.

4. If you suspected that your patient had acute pyelonephritis, which of the following antibiotic regimens would you choose?

- **A) Trimethoprim/sulfamethoxazole DS PO BID for 3 days.**
- **B) Trimethoprim/sulfamethoxazole DS PO BID for 10 days.**
- **C) Levofloxacin 500 mg PO QD for 7 days.**
- **D) Ceftriaxone 1 g IV QD for 7 days.**

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Prevention of recurrence:

- Encourage good fluid intake, Void at 2-3 hr. intervals
- Void at bed time
- switching to another method of birth control
- proper perineal hygiene,
- voiding after intercourse.

Objectives you should acheive:

- Evaluate a patient with urinary symptoms
- Treat uncomplicated UTI

Cap

tion

- Identify risk factors for complicated UTI
- Manage a patient with pyelonephritis


BEST WISHES